

Amendment and Response

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Serial No.: 10/646,545

Confirmation No.: 9714

Filed: August 21, 2003

For: MEDICAL LEAD CONNECTOR SYSTEMS WITH ADAPTERS (as amended)

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

1. (Currently Amended) A medical system comprising:

an implantable medical device including a connector bore, the connector bore ~~having~~ comprising one or more conductive connector block portions along an inner surface;

a single lead connector including a plurality of lead connector elements electrically isolated from one another and spaced apart along the single lead connector;

a plurality of elongated insulated conductors;

a plurality of lead electrodes, each electrode of the plurality of lead electrodes coupled to a corresponding lead connector element of the plurality of lead connector elements via the plurality of elongated insulated conductors;

a first adapter [[,]] extending from a ~~first~~ proximal end to a ~~first~~ distal end, wherein the first adapter comprises:

an external surface to engage the inner surface of the connector bore, wherein the external surface comprises one or more conductive portions to electrically engage the one or more conductive connector block portions of the connector bore of the implantable medical device,

an ~~having a first~~ internal surface forming a ~~first~~ lumen to receive the single lead connector, and ~~positioned within the first adapter and a first~~

one or more electrical contact element elements, wherein each electrical contact element of the one or more electrical contact elements is electrically coupled to a corresponding conductive portion of the one or more conductive portions of the external surface, wherein the one or more electrical contact elements are positioned along the ~~first- inner~~ internal surface and are electrically isolated from each other, at a ~~first distance from the proximal end~~ wherein each of the one or more electrical contact elements is

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electrically coupled with one of the ~~for electrically coupling with a first lead connector element elements~~ of the plurality of lead connector elements when the single lead connector is ~~positioned~~ received within the first lumen~~[[,]]~~

~~the first adapter including a first insulative layer extending along the first inner-surface to prevent electrical coupling of other than the first lead connector element; and a second adapter extending from a second proximal end to a second distal end, wherein~~
the second adapter comprises:

an external surface to engage the inner surface of the connector bore, wherein the external surface comprises one or more conductive portions to electrically engage the one or more conductive connector block portions of the connector bore of the implantable medical device, having a second

an internal surface forming a second lumen to receive the single lead connector,
and positioned within the second adapter and a second

one or more electrical contact element elements, wherein each electrical contact element of the one or more electrical contact elements is electrically coupled to a corresponding conductive portion of the one or more conductive portions of the external surface, wherein the one or more electrical contacts are positioned along the second inner internal surface and are electrically isolated from each other, at a second distance from the second proximal end wherein each of the one or more electrical contact elements is electrically coupled with one of the ~~for electrically coupling with a second lead connector element elements~~ of the plurality of lead connector elements ~~other than the first lead connector element~~ when the single lead connector is ~~positioned~~ received within the second lumen,

~~the second adapter including a second insulative layer extending along the second inner surface to prevent electrical coupling of other than the second lead connector element,~~

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wherein the one or more conductive portions of the external surface of the first adapter are located in the same location as the one or more conductive portions of the external surface of the second adapter, wherein at least one electrical contact element of the one or more electrical contact elements of the first adapter is located in a different location along the internal surface thereof than the one or more electrical contact elements of the second adapter.

~~wherein each of the first adapter and the second adapter include a respective external surface to engage the inner surface the connector bore, the respective external surfaces including a conductive surface electrically coupled to the corresponding first and second electrical contact element to electrically engage the corresponding first and second electrical contact element within the connector bore,~~

~~wherein one of the first adapter and the second adapter configured to be up-sized.~~

2. (Currently Amended) The medical system of claim 1, wherein the external surface of each of the first and the second adapter conforms to an industry standard.
3. (Previously Presented) The medical system of claim 1, wherein the lead connector further includes a connector ring positioned distal to the plurality of lead connector elements for electrical connection within the connector bore.
4. (Previously Presented) The medical system of claim 3, wherein the lead connector further includes a plurality of sealing rings positioned distal to the plurality of connector elements, a first sealing ring of the plurality of sealing rings positioned proximal to the connector ring and a second sealing ring of the plurality of sealing rings positioned distal to the connector ring.
5. (Previously Presented) The medical system of claim 1, wherein each lead connector element of the plurality of lead connector elements includes an outwardly extending protrusion.

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6. (Previously Presented) The medical system of claim 1, wherein the first lumen of the first adapter is and the second lumen are dimensioned to form a press fit about the plurality of lead connector elements when the plurality of lead connector elements is received positioned within one of the first lumen and the second lumen of the first adapter, and wherein the lumen of the second adapter is dimensioned to form a press fit about the plurality of lead connector elements when the plurality of lead connector elements is received within the lumen of the second adapter.

7-10. (Canceled)

11. (Currently Amended) A method for coupling a lead connector comprising a plurality of lead connector elements selected one electrode of a plurality of electrodes to an implantable medical device including a connector bore, the connector bore comprising one or more conductive connector block portions along an inner surface, the method comprising:

selecting an adapter from a first adapter and a second adapter, wherein the first adapter extending extends from a first proximal end to a first distal end, having wherein the first adapter comprises:

an external surface to engage the inner surface of the connector bore, wherein the external surface comprises one or more conductive portions to electrically engage the one or more conductive connector block portions of the connector bore of the implantable medical device,

an a first internal surface forming a first lumen to receive [[a]] the lead connector, and positioned within the first adapter and

one or more a first electrical contact element elements, wherein each electrical contact element of the one or more electrical contact elements is electrically coupled to a corresponding conductive portion of the one or more conductive portions of the external surface, wherein the one or more electrical contact elements are positioned along the first-

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~~inner~~ internal surface and are electrically isolated from each other, at a first distance from the first proximal end wherein each of the one or more electrical contact elements is electrically coupled with one of the ~~for electrically coupling with a first lead connector element~~ elements of [[a]] the plurality of lead connector elements when the lead connector is positioned ~~received~~ within the first lumen,

~~the first adapter including a first insulative layer extending along the first inner surface to prevent electrical coupling of other than the first lead connector element, and wherein the~~ [[a]] second adapter extending extends from a second proximal end to a second distal end, having wherein the second adapter comprises:

an external surface to engage the inner surface of the connector bore, wherein the external surface comprises one or more conductive portions to electrically engage the one or more conductive connector block portions of the connector bore of the implantable medical device,

an a-second internal surface forming a second lumen to receive the lead connector, ~~and positioned within the second adapter and~~

one or more a-second electrical contact element elements, wherein each electrical contact element of the one or more electrical contact elements is electrically coupled to a corresponding conductive portion of the one or more conductive portions of the external surface, wherein the one or more electrical contact elements are positioned along the second-inner internal surface and are electrically isolated from each other, at a second distance from the second proximal end wherein each of the one or more electrical contact elements is electrically coupled with one of the ~~for electrically coupling with a second lead connector element~~ elements of the plurality of lead connector elements other than the first lead connector element when the lead connector is positioned ~~received~~ within the second lumen,

wherein the one or more conductive portions of the external surface of the first adapter are located in the same location as the one or more conductive portions of the

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external surface of the second adapter, wherein at least one electrical contact element of the one or more electrical contact elements of the first adapter is located in a different location along the internal surface thereof than the one or more electrical contact elements of the second adapter;

~~the second adapter including a second insulative layer extending along the second inner surface to prevent electrical coupling of other than the second lead connector element, wherein the first adapter configured to be up-sized; and~~
positioning the lead connector within the lumen of the selected adapter.

12. (Currently Amended) The method of claim 11, further comprising positioning the lead connector positioned within the lumen of the selected adapter within ~~[[a]]~~ the connector bore of the implantable medical device.

13. (Currently Amended) A system for coupling a lead connector having a plurality of lead connector elements within a connector bore of an implantable medical device, the connector bore comprising one or more conductive connector block portions along an inner surface, the system comprising:

a first adapter ~~[[,]]~~ extending from a first proximal end to a first distal end, wherein the first adapter comprises: having a first

an external surface to engage the inner surface of the connector bore, wherein the external surface comprises one or more conductive portions to electrically engage the one or more conductive connector block portions of the connector bore of the implantable medical device,

an internal surface forming a first lumen to receive the lead connector, and
~~positioned within the first adapter and~~

one or more a first electrical contact element elements, wherein each of the one or more electrical contact elements is electrically coupled to a corresponding conductive

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surface of the one or more conductive surfaces of the external surface, wherein the one or more electrical contacts are positioned along the first inner internal surface and are electrically isolated from each other, at a first distance from the first proximal end wherein each of the one or more electrical contact elements is electrically coupled with one of the for electrically coupling with a first lead connector element elements of the plurality of lead connector elements when the lead connector is positioned received within the first lumen[[,]]

the first adapter including a first insulative layer extending along the first inner surface to prevent electrical coupling of other than the first lead connector element; and a second adapter extending from a second proximal end to a second distal end, wherein the second adapter comprises: having a second

an external surface to engage the inner surface of the connector bore, wherein the external surface comprises one or more conductive portions to electrically engage the one or more conductive connector block portions of the connector bore of the implantable medical device,

an internal surface forming a second lumen to receive the lead connector, and positioned within the second adapter and a second

one or more electrical contact element elements, wherein each electrical contact element of the one or more electrical contact elements is electrically coupled to a corresponding conductive surface of the one or more conductive surfaces of the external surface, wherein the one or more electrical contacts are positioned along the second inner internal surface and are electrically isolated from each other, at a second distance from the second proximal end wherein each of the one or more electrical contact elements is electrically coupled with one of the for electrically coupling with a second lead connector element elements of the plurality of lead connector elements other than the first lead connector element when the lead connector is positioned received within the second lumen,

~~the second adapter including a second insulative layer extending along the second inner surface to prevent electrical coupling of other than the second lead connector element,~~

wherein the one or more conductive portions of the external surface of the first adapter are located in the same location as the one or more conductive portions of the external surface of the second adapter, wherein at least one electrical contact element of the one or more electrical contact elements of the first adapter is located in a different location along the internal surface thereof than the one or more electrical contact elements of the second adapter.

~~wherein the first adapter configured to be up-sized, and wherein each of the first adapter and the second adapter include a respective external surface to engage the inner surface the connector bore, the respective external surfaces including a conductive surface electrically coupled to the corresponding first and second electrical contact element to electrically engage the corresponding first and second electrical contact element within the connector bore.~~

14. (Canceled)

15. (Canceled)

16. (New) A medical system for coupling a lead connector to a medical device, wherein the medical device comprises a connector bore defining an inner surface, wherein the lead connector comprises a plurality of lead connector elements electrically isolated from one another and spaced apart along the lead connector, wherein the system comprises a plurality of adapters, wherein the plurality of adapters comprises:

a first adapter and a second adapter, wherein each of the first and the second adapters extends from a proximal end to a distal end and defines an opening configured to receive the lead connector, wherein each of the first and the second adapters further defines an external surface to engage the inner surface of the connector bore of the medical device when the adapter is received

therein and an inner surface defining at least a portion of the opening to engage the lead connector when the lead connector is received therein, wherein each of the first and the second adapters comprises:

- an external contact element along the external surface to electrically couple to a conductive portion on the inner surface of the connector bore of the medical device when the adapter is received therein, and

- an internal contact element along the internal surface to electrically couple to one lead connector element of the plurality of lead connector elements when the adapter receives the lead connector within the opening, wherein the internal contact element is electrically coupled to the external contact element,

wherein the external contact element of the first adapter is located along the external surface of the first adapter in the same location as the external contact element of the second adapter, and further wherein the internal contact element of the first adapter that is electrically coupled to the external contact element of the first adapter is located along the internal surface of the first adapter in a different location than the internal contact element of the second adapter that is electrically coupled to the external contact of the second adapter.

17. (New) The system of claim 16, wherein the plurality of lead connector elements of the lead connector comprises:

- a first lead connector element, and

- a second lead connector element,

wherein the internal contact element of the first adapter is located along the internal contact surface to contact the first lead connector element when the lead connector is received within the opening of the first adapter and the internal contact element of the second adapter is located along the internal contact surface to contact the second lead connector element when the lead connector is received within the opening of the second adapter.

18. (New) The system of claim 17, wherein each of the first and the second adapters further comprises insulative material, wherein the insulative material of the first adapter electrically isolates the second lead connector element from the internal contact element of the first adapter when the lead connector is received within the opening of the first adapter, and wherein the insulative material of the second adapter electrically isolates the first lead connector element from the internal contact element of the second adapter when the lead connector is received within the opening of the second adapter.
19. (New) The system of claim 16, wherein the internal contact element of the first adapter is located along the internal contact surface a first distance away from the proximal end of the first adapter, wherein the internal contact element of the second adapter is located along the internal contact surface a second distance away from the proximal end of the second adapter, and wherein the first distance and the second distance are different.
20. (New) The system of claim 16, wherein the external contact element of each of the first and the second adapters comprises a ring contact.
21. (New) The system of claim 16, wherein the diameter of the opening of the first adapter is larger than the diameter of the opening of the second adapter.
22. (New) The system of claim 16, wherein the external surface of each of the first and the second adapters comprises a label, and further wherein the label of the external surface of the first adapter is different than the label of the external surface of the second adapter to distinguish between the first adapter and the second adapter.